chapter, and the author concludes that it was derived from the basic igneous rocks themselves. De Launay, Perkins, and other mining authorities share that view, which has, however, been rejected by Prof. Louis, who considers that the gold came from quartz veins in the schists and gneisses, and also by Mr. J. A. Spurr, who thinks it is derived from the acid igneous rocks, and was introduced in solutions connected with the intrusion of dykes of the ultra-acid rock which he has called alaskite. Some of the placer gold has been derived directly from quartz veins formed in the superficial sheets of laterite that cover much of the country, but the gold in these veins is no doubt derived from the primary deposits in the underlying rocks. The gold in the secondary veins in the laterite sometimes occurs in rich pockets. It is therefore not surprising that the placer gold includes small nuggets. Mr. Brown, however, strongly supports the view that gold is present dissolved in the soil waters, and is thus carried into the drifts and there chemically deposited. As a proof of the solubility of the gold in the waters of the soil, he refers to its presence in the vegetation. The occurrence of gold in the trees growing on gold-fields has been repeatedly affirmed and denied. Mr. Harrison accordingly carefully assayed samples of wood from the interior of trees, and proved that the ashes contain gold up to several grains per ton. The establishment of this fact by Mr. Harrison is an important contribution to the problems of gold deposition; nevertheless, thé information he gives as to the distribution of the alluvial gold suggests that the bulk of it is of detrital origin.

(2) Mr. Johnson's book contains less original matter. It is a short summary, in sixty-one pages of large type, of the chief facts as to the distribution of base metals in South Africa. It is prefaced by a brief theoretical introduction, and concludes with some pages of practical hints to prospectors. It is a useful guide to recent literature, and to mining work on the base metals in South Africa. The author adopts the American quantitative classification of rocks, and his short theoretical statement gives the arguments fairly for both sides of disputed questions. J. W. G.

OUR BOOK SHELF.

The Method and Scope of Genetics. An Inaugural Lecture delivered on October 23, 1908. By Prof. W. Bateson, F.R.S. Pp. iv+49. (Cambridge: University Press, 1908.) Price 1*s.* 6*d.* net.

THE University of Cambridge is to be congratulated in respect of the professorship of biology, which it founded last year, with the aid of an anonymous benefactor. It is to be congratulated because it has had the wisdom to recognise the import and the promise of a kind of inquiry which is still young (though it justified itself long ago at Down, at Brünn, and elsewhere), and has hitherto had very little academic recognition; for although the professorship bears the comprehensive title "of biology," it was founded with the understanding that the holder should apply himself to a particular class of physiological problems—those of heredity and variation—the study of which is denoted by the new term "genetics." Some years ago, in the University of Edinburgh, thanks, we believe, to the energy of Prof. Cossar Ewart, whose "Penycuik Experiments" have been so important in themselves and in their incentive, there was established a lectureship on the physiology of reproduction, which has been filled by Dr. A. H. H. Marshal with conspicuous success.

But Cambridge has gone one better—we hope the equivalent Scottish step will soon follow—in instituting this professorship of biology, ear-marked to mean genetics. The University of Cambridge is not less to be congratulated on being able to secure for this new professorship an investigator like Mr. Bateson—on whom Darwin's mantle has fallen—whose critical insight, patience, ingenuity of experiment and infectious enthusiasm have won him the respect and admiration of all the biologists of to-day.

In his inaugural lecture Prof. Bateson shows that the claims put forward in the name of genetics are high, and that they are not high without reason. "Mendel's clue has shown the way into a realm of nature which for surprising novelty and adventure is hardly to be excelled." "It is no hyperbolical figure that I use when I speak of Mendelian discovery leading us into a new world, the very existence of which was unsuspected before." Let us notice some of the progressive results which warrant these enthusiastic statements. A great law of inheritance has been discovered, and a simple hypothetical *rationale* of the law has been suggested. The duality of inheritance which the cytologist had demonstrated in his own way has been likewise proved—one may almost say played with—experimentally. Curiously puzzling phenomena have been made plain. Fresh light has been thrown on reversion and on variation. A new *point d'appui* has been found for physiological chemistry, and from cases so different as cinnamon-canaries and sweet peas, currant-moths and colour-blindness, it seems as if we were on the eve of discovering something of the mystery of sex. And, besides all this, "if we want to raise mangels that will not run to seed, or to breed a cow that will give more milk in less time, or milk with more butter and less water, we can turn to genetics with every hope that something can be done in these laudable directions." Even in regard to human kind it does not seem any longer an idle dream to see an art of eugenics rising on the foundations of genetics. J. A. T.

Hydraulic Générale. By A. Boulanger. 2 Vols. Tome i., Principes et Problèmes Fondamenteaux. Pp. xvi+382. Tome ii., Problèmes à Singularités et Applications. Pp. vii+299. (Paris: Octave Doin et Fils.) Price 10 francs.

THE science of hydraulics in France has long been served by distinguished and devoted adherents—to instance only a few, Bazin, St. Venant, Du Buat, Prony, and Boussinesq. The numerous contributions of this last-named exponent, during a period of nearly forty years, to the Academy of Sciences and other scientific bodies, are familiar enough to students of the subject, but, owing to their detached and voluminous character (the total publications of the eminent man of science amount to 1800 quarto pages), they have not hitherto been conveniently adapted to the requirements of systematic study, and it has long been felt that a *résumé* of their more important conclusions would be of great service. At the instance, therefore, of the director of the Bibliothèque de Mécanique, and with the concurrence of M. Boussinesq himself, the present work was undertaken with this end in view.

There are two volumes, the first being devoted to a demonstration of fundamental principles and to the statement of general phenomena, appertaining as much to the province of the physicist as to that of the engineer. Thus, after an introduction on the laws

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governing the pressure and deformation of a confined material element, and on the movements of fluids in general, there are three sections dealing with phenomena in which the influence of friction is negligible or sensible, and covering the motion of waves and the flow of water in pipes and channels.

The second volume is occupied with the elucidation of problems which appeal more particularly to the practical engineer, who, apart from his interest in the purely scientific aspect of an investigation, demands for his use some definite, even if empirical, quantitative solution. To arrive at such results, postulates of a more or less contestable character have oftentimes to be assumed, and the processes cannot be as rigorous as a mere theorist would desire. The questions treated in this way include the flow of water through orifices and over weirs, and in pipes possessing abrupt changes of direction and sudden restrictions of area. The influence of friction on undular movement is also expounded, and a final chapter deals with water-hammer.

The work is based on mathematical processes of a very advanced nature, and from considerations of space the calculations, many of them intricate enough, have been set forth as succinctly as possible. For further information on particular points the reader is referred to various sections of M. Boussinesq's writings which deal specially with them. There is a serviceable bibliographical index at the end of each volume.

The author manifests his keen appreciation of the *travaux pénétrants* of M. Boussinesq, and concludes his preface by stating:—"Qu'il n'est pas de question d'hydrodynamique appliquée qui ne doive à ce Maître des progrès considérables." The tribute is just, and will be heartily endorsed by British men of science.

The Chadwick Lectures, University of London, Session 1907–8. By W. D. Scott-Moncrieff. Pp. 79. (London: St. Bride's Press, Ltd., 1909.) Price 2s. net.

THE Chadwick lectures in the University of London were established in 1907 for a period of five years, the endowment being derived from the funds of the trust created by the will of a great sanitarian, Sir Edwin Chadwick, K.C.B. The trustees have provided that two short courses of lectures shall be delivered each year, at the University, upon subjects relating to sanitary science, with special reference to recent advances in hygiene and municipal engineering. In the lectures under review, Mr. W. D. Scott-Moncrieff deals with the subject of sewerage and sewage disposal in four lectures. At the outset he deals with facts which are mainly historical, tracing the evolution of our present methods, and summarising the Acts of Parliament and the reports of Royal and other Commissions relating to sewage disposal. He then proceeds to a critical survey of the various provisions which have been made, from time to time and in different places, for purifying sewage.

The lectures will serve exceedingly well to indicate the lines upon which we are now advancing towards the solution of the sewage problem, and the lecturer is to be congratulated upon having made an interesting, instructive, and suggestive contribution to the subject of sewage disposal. He strongly emphasises the waste of manurial values involved in modern methods and the economy of ascertaining by direct experiment the conditions necessary to success, in every specific instance, before spending money in ignorance of what these conditions really are. As one of the pioneers among British workers upon the biological purification of sewage, he remains a strong advocate of that method.

After reviewing the enormous amount of study and experiment which chemists, biologists, and engineers have for many years devoted to the subject of sewage purification, the reader will find food for contemplation in the circumstance that the trend of modern scientific opinion is in favour of the methods of "mother earth." Biological agencies, "the scavengers of nature," are now generally considered to afford at once the most economical and effectual means of sewage purification. The natural disposal of fæces upon earth had always proved satisfactory so long as the soil was suitable in nature and amount, but with the growth of our towns and the introduction of the water-carriage system a new set of circumstances had to be faced. Large volumes of water polluted with fæcal matter had to be dealt with, and the disposal of this, without causing a nuisance or contaminating drinking-water supplies, became the problem which is even now but partly solved. Mr. Scott-Moncrieff shares the very general view that it is by methods in which "nature's scavengers" are placed under the best conditions for their work that we are likely to obtain the best all-round results.

LETTERS TO THE EDITOR.

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The Temperature of the Upper Atmosphere.

SINCE my last letter on the above subject the columns of NATURE have contained some interesting data from Mr. E. Gold, and an account of the meeting at Monaco on April 1 of the International Commission for Scientific Aëronautics. The proceedings of the commission seem to have included the enunciation of a creed in which the members expressed their individual belief in the existence of an "isothermal layer" (*aliter* "stratosphere"). This promulgation was apparently intended mainly for the benefit of heretics in England. As is not unusual with creeds, an exact definition of the essential term *stratosphere* does not seem to have been supplied, and I am thus in doubt whether I am or am not one of the elect. The term "stratosphere" can hardly have been employed in its very strictest sense, which would seem to imply that at any given instant of time temperature is a function only of the distance above the ground. This obviously could not be true at altitudes where either a diurnal or an annual variation was sensible, and I doubt whether members of the commission are yet prepared to deny the existence of these variations at the heights with which they are concerned. In the recent German balloon ascents in Central Africa temperatures were recorded which differ somewhat notably from those met with at corresponding heights in Europe, while in the polar regions temperatures are sometimes recorded at ground-levels which are lower than those usually encountered in balloon ascents here.

The term *stratosphere* is thus presumably intended merely to indicate in a general way that at high levels the rate of change of temperature in any horizontal direction is normally very small. In this sense I too am rather disposed to be a stratospherist. What has been objected to by myself, and I believe I speak for others in this country, is the application of the term "isothermal layer" to the whole of the upper atmosphere—so far as yet explored by kites and balloons—which exists above the level where fall of temperature with increase of height ceases (*cf.* Mr. W. H. Dines, NATURE, February 27, 1908, p. 390). I see no objection to the application of the term to a layer of finite thickness, if such exists, throughout which rate of change of temperature with height is vanishingly small. If t and h denote temperature and height, then, according to most Continental balloon

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